Supervision 1

Jiachen Jiang

Read the following sections of the handouts 1.3 Dimensional Analysis 1.4 Quantities, units and symbols 1.5.3 A university-style approach

Q1

Problem Sheet - Introduction – Question 1

Q2

Additional Problems – Introduction – Question 1

Q3

Past Exams

The fundamental frequency of a circular drum skin depends on its radius, the mass per unit area of the skin and the tension (the force per unit length applied at the rim). Use dimensional analysis to predict the effect on the frequency of simultaneously doubling the radius and the tension.

Q4

Past Exams

Gas clouds exceeding a certain mass, the Jeans mass M J , are unstable to gravitational collapse and this mass depends only on the sound speed in the gas v, the gravitational constant G and the surface pressure of the cloud P. Use dimensional analysis to find how the Jeans mass depends on these quantities.

Q5

Past Exams

Estimate the orbital radius for geostationary satellites.

[The radius of the Earth is 6400 km and you may take the value of g at the Earth's surface to be 9.8 m s^{-2}. Note that the mass of the Earth is not given in the exam papers.]

Q6

Problem Sheet - Introduction – Question 2.2

An additional question for 2.2 (b)

(iii) cubes 2 and 3 are separate. As soon as cube 2 and 3 collide, they are stuck together. Calculate the final speeds of cubes 2 and 3 and the loss of energy in this process.